NEEDS ASSESSMENT OF MONTANA NATURAL RESOURCE INFORMATION USERS

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ABSTRACT

Thirteen natural resource user groups were surveyed to determine user needs for natural resource information and data management. A total of 481 questionnaires were mailed to individuals and groups representing a variety of known or potential natural resource users such as government, industry, academia, and public interest groups. Sixty-six percent of the questionnaires were completed and returned. State and federal government agencies represented 25 percent of the survey participants.

Respondents indicated that the most serious problem in obtaining natural resource data is that they are unaware of existing sources of data. Forty-one percent of the respondents indicated that this was a serious problem and 44 percent indicated that it was a moderate problem. In solving this problem, 57 percent indicated the development of an automated geographical and subject area indexing system to existing data sources should be given a high priority in NRIS program development.

Respondents were asked to indicate which natural resource categories posed the greatest difficulties in obtaining data. The responses indicated that water resources are by far the most difficult natural resource category for which to obtain data, with groundwater data being more difficult to obtain than surface water data.

The five most useful types of natural resource information are published maps, books and journal articles, expert personal communication, aerial photographs/imagery, and published technical reports. It also was reported by the majority of the respondents that these five types of natural resource data were the least difficult to obtain.

It is evident from the survey results that there is a need and an interest by potential users for a centralized, natural resource information system. Survey participants have expressed their opinions concerning: the usefulness of various natural resource data sources and types, impediments experienced in obtaining natural resource data, and preferences for the development of the NRIS information system. These responses will form the framework for the NRIS statewide system.

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I. INTRODUCTION

The Montana Natural Resource Information System (NRIS) was established by the Legislature to implement and maintain a comprehensive system for the acquisition, storage, and retrieval of Montana natural resource information. Because of the diversity of natural resource information in Montana and the broad range of user groups, a needs assessment was conducted to assist the NRIS in determining priorities for program developments. The establishment of such priorities will enable the NRIS to focus its program efforts in proportion to the expected user demand.

The information needs of specific natural resource user groups and their perceived areas of priority were assessed through a mail survey conducted by Economic Consultants Northwest (ECN) under contract to NRIS. The primary objectives of the user needs assessment were to:

1) Identify known and potential users of Montana natural resource information.
2) Identify needs of users of natural resource information and the characteristics of a system that would most effectively and efficiently meet those needs.
3) Analyze the survey results and make recommendations concerning user group priorities, resource area priorities, and system features which would be most compatible with user group desires and expectations.

This report describes the methods used to conduct the survey and the analysis of the survey results. Based on the information obtained from survey participants, recommendations are presented for NRIS program development. Supplements to this report contain the mailing list for the NRIS newsletter, survey frequency distributions, requested cross-tabulations, and contingency tables for weighted and unweighted results.

II. METHODOLOGY

A mail survey was used to gather information from individuals and groups who use Montana natural resource data. On March 17, 1986, questionnaires were mailed by ECN to 456 known or potential users of natural resource data.[1] Approximately 12 days later, follow-up telephone calls were made to persons who had not yet returned their completed questionnaire.

The following sections describe the procedures used in developing the mailing list, designing the questionnaire, administering the survey, automating the data, and analyzing the data. The questionnaire and cover letter are contained in Appendix A.

A. Sample Design

An automated mailing list was created for 13 known or potential user groups of Montana natural resource information. The mailing list was prepared by ECN and reviewed by NRIS and the Natural Resources System Advisory Committee at its March 4 meeting. Although this list did not include all possible users, a broad sample of various types of users is represented. Appropriate contact people (i.e., the person directly responsible for natural resource data) were identified from lists provided by various agencies, telephone calls, and personal knowledge of the most appropriate natural resource information users. Table 1 presents the sampling design for each of the 13 target user groups.

B. Survey Process

The success of the survey is dependent upon the willingness of the respondents to take the necessary time to thoughtfully complete the questionnaire and to return it in a timely manner. Many factors influence the inclination of the respondent to be cooperative and sympathetic to the study objectives. The following are some of the design factors that were integrated into the development and administration of the survey to maximize the response rate.

1. Questionnaire Design

The NRIS survey instrument was designed with the following basic, but essential, considerations. All steps taken had the objective of maximizing the survey response by conveying to the respondent that the survey was important so they would take the time to carefully and thoughtfully complete and return the questionnaire.

a) Appearance: The questionnaire was printed in a booklet form with the front page providing a fact sheet about NRIS and its

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[1] About two weeks after the initial mailout, the Montana Mining Association (at the request of Larry Thompson, NRIS Program Director) sent out questionnaires to 25 mining companies, bringing the total number of questionnaires mailed out to 481. Because ECN had no quality control over this segment of the survey process, the survey methods discussed in this chapter will only be relative to those techniques used by ECN.

TABLE 1

SAMPLING DESIGN FOR NATURAL
RESOURCE USER GROUPS

User Group	Potential Contacts	Source of Information
Consultants (Agricultural Consultants, Engineers, Environmental Consultants, Geologists, Hydrologists, Aerial Photographers)	67	Yellow pages of Montana telephone directories
Universities/Colleges (Montana State University, University of Montana, Montana College of Mineral Science and Technology, Montana Bureau of Mines and Geology, Eastern Montana College, Northern Montana College, Rocky Mountain College)	45	Faculty directories for Montana State University and University of Montana, NRIS list of interested persons
State Government (10 agencies)	49	Montana State Government Directory, NRIS list of interested persons[1]
Federal Government	45	Federal Telephone Directory, NRIS list of interested persons
Indian Tribes (At least 1 natural resource representative from each tribe)	9	List provided by the Coordinator of Indian Affairs (Department of Commerce)
Natural Resource Attorneys	18	Yellow pages of Montana telephone directories, personal knowledge of known natural resource attorneys
Environmental/Citizen Groups	13	Montana telephone directories, known sources, NRIS list of interested persons

Table 1 (continued)

User Group	Potential Contacts	Source of Information
Industry (Utility companies, timber industries, mining companies)	77[2]	Montana Energy Almanac, yellow pages of Montana telephone directories, NRIS list of interested persons
Local Government Planning Boards	43	Community Development Bureau (Department of Commerce)
Special Groups, Commissions	28	Montana Department of Agriculture, Montana Energy Almanac, Montana telephone directories, NRIS list of interested persons
Libraries (public, university, college, consulting firm, and state and local government libraries)	32	Montana Library Directory, NRIS list
Secondary Schools	7	Department of Basic Instruction Services (Office of Public Instruction)
District Conservationists	48	DNRC Conservation District Directory
TOTAL	481	

[1] Directors or division administrators of the principal natural resource agencies in state government were asked to indicate to whom they wished the questionnaire be sent.

[2] ECN mailed out 52 questionnaires and the Montana Mining Association sent out 25 questionnaires to mining companies.

functions and the back page allowing space for respondent comments. The questionnaire appearance was designed to be aesthetically pleasing and professional, conveying to the respondent that much time and effort went into the design because of the importance of the study.

b) Organization: The questionnaire was organized so that the first question was less complex and required less personal opinion than did later questions. By ordering the least confusing question first, the respondents were less likely to immediately discard or lay the questionnaire aside because it appeared to require too much time or effort to complete.

The questions that followed concerned the respondents' opinions about the usefulness of various types of natural resource information, the difficulty (if any) the respondents have experienced in obtaining several types of natural resource data from different sources, and demographic questions (i.e., questions that elicited information specific to the respondents' company, agency, or group). Demographic questions were placed last so that reluctance to answer such questions would not inhibit responses to the essential questions directly addressing the natural resource user's perceived data needs.

c) Questionnaire Length: An important objective of the questionnaire design was to keep the survey as short as possible yet provide the needed natural resource information. Although several of the answer categories were relatively long, it was thought that all of the categories were necessary to gather the pertinent information. After the last pretest, two less important questions were omitted to reduce the questionnaire length.

d) Personalization: It was important that the questionnaire created a feeling of personal communication between ECN and the survey participants. A personalized approach conveyed to the respondents the critical message that the study is important and that their participation was necessary for the success of the survey.

A cover letter from the NRIS Program Director (Larry Thompson) accompanied the questionnaire. This letter explained the establishment of NRIS, the overall nature and usefulness of the study, and assured the respondent of complete confidentiality. To give each letter more of a "personal touch," all letters were originals, contained the respondent's name in the salutation, and were individually signed by Larry Thompson.

As another method of personalizing the questionnaire, the respondents were encouraged to write additional comments on

the back page. Although no attempt was made to code these comments for data analysis, the comments served a dual purpose of allowing the survey participant to express any concerns or ideas not addressed in the questionnaire and of providing the NRIS with additional information.

e) Questionnaire Identification: All questionnaires had an identifying label attached that showed the respondent's name and mailing address. The presence of this identifying feature was necessary to conduct follow-up telephone calls, and its presence was explained to the respondents in a straightforward manner in the cover letter.

The identifying label also will assist the NRIS in developing a mailing list for the proposed NRIS newsletter. Survey participants were asked whether they wanted to be included on the NRIS newsletter mailing list and to make any corrections to the mailing label.

2. Pretesting

Pretesting, a necessary part of the survey process, allowed the ECN staff to identify problems such as respondent's confusion about question meanings or the inability of respondents to answer within the confines of the provided answer categories. The pretesting effort was divided into three stages.

The first stage was the critique of the questionnaire by individuals who understood the purpose of the study (e.g., NRIS Program Director, ECN staff, and a Natural Resource Specialist). The second stage involved the development of a mock-up questionnaire that was administered to and completed by the Montana Natural Resources Data System Advisory Committee at its March 4 meeting. As a result of this pretest, modifications were made and the questionnaire was pretested again (third stage) with representatives of selected target groups (i.e., natural resource attorney, private consultant, Department of State Lands employee, Department of Fish, Wildlife and Parks employee, and Natural Heritage Program employee). The questionnaire was revised for the final time, reflecting problems and criticisms acknowledged during all pretesting stages.

3. Administration of Survey and Follow-up Telephone Calls

The survey packet that was mailed to the natural resource user groups contained the NRIS cover letter and questionnaire (Appendix A). To remind the respondent that there would be no cost and little inconvenience required to return the questionnaire, a preaddressed return envelope was printed on the back of the questionnaire and affixed with first-class postage.

Twelve business days after the mailout, follow-up telephone calls were made to users who had not returned their completed questionnaire. During this follow-up period, many potential respondents were contacted and requested to return the completed questionnaire. Although at least three attempts were made to "no answers," a few users were never contacted

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due to no answers. Because the response rate was already high for the District Conservationist user group, no follow-up calls were conducted with these users.

4. Data Automation

Survey responses were entered so that data could be analyzed for each natural resource user group or for all respondents as a whole. After survey responses had been entered, editing and outlier analyses were performed on those categories that had responses which were not in the predefined range. The data were then changed if it appeared there was a data entry error. Responses not in the provided answer categories were coded as "0", while multiple responses were coded as "7". For example, if one marked two columns (very useful and useful), the response was entered as a "7" and the actual answers were manually recorded (refer to the supplement to the report).

Frequency distributions were generated for all questions. After examining the distribution of each of the variables, sets of relationships among two or more variables were investigated using contingency table analysis (cross-tabulations or joint frequency distributions). The cross-tabulation analysis not only yields frequency distribution estimates, but also provides statistics designed to measure whether or not the variables are statistically independent (e.g., Chi-square). The supplement to this report contains the computer output of the frequency distributions and cross-tabulations.

C. Data Analysis

1. Inferences

This study was primarily concerned with estimating the proportion of the population responding to each part of the questionnaire. In general, the procedure used to estimate population proportions is quite simple. The population is sampled and an estimate of the population proportion is made on the basis of the proportion in the sample.

These estimates are accurate only to the extent that the nonsampling errors (respondent refusals, inability to contact all respondents, and imperfections in the questionnaire design) have been minimized and that the sample is representative of the true population. It is often more useful to give estimates of population proportions in terms of a range of values. This range (confidence interval) designates an interval within which the true population proportion is expected to lie in a determined percentage of all possible cases and is calculated using the population size, the sample size, standard error, and the "confidence" one desires in the estimate. For this survey, the population size (maximum potential users of the NRIS system) was estimated at 1,000 and the number of returned questionnaires (sample size) was 315. The maximum standard error for each individual proportional estimate is given by the following formula:

$$SE = ((1 - n/N) * P * (1 - P)/(n-1))^{1/2}$$

Where for maximum possible error,

P = .5
N = Population Size (1,000)
n = Sample Size (315)

Then for the proportional estimates (Pr) presented in this survey with a 95 percent confidence interval,

$$Pr \pm ((1 - 315/1{,}000) * .5 * .5/315)^{1/2} * 1.96 + 1/630$$

or

$$Pr \pm .0234 * 1.96 + .001$$

$$Pr \pm .047$$

This implies that 95 percent of the time the true population proportion for each estimate will fall within the interval Pr $\pm$ .047. For example, on Question 1, one can be 95 percent confident that the true proportion of those respondents that often use Montana natural resource information related to planning ("often" being one of three possible respondent choices for frequency of use) is between 38.2 percent and 47.6 percent (i.e., 42.9 $\pm$ 4.7 percent). This statement assumes that the demographics of the respondents are representative of the true population.

2. Presentation of Results

The results from this survey were presented in raw form (unweighted) and as grouped data (weighted). The unweighted data are presented in Appendix B and include both raw scores and proportional estimates.

The weighted data, which illustrates only proportional estimates, are presented in the supplement to the report. These estimates were determined by categorizing the respondents into 9 groups instead of 13 (see explanation in Section A of Chapter IV) and weighting the proportions estimates from each group equally to determine an "average group response." The preceding section on inferences does not apply to this group because these estimates are biased by the weighting scheme.

3. Analysis of Nonresponse

Natural resource users were surveyed through a postal questionnaire mailed to names obtained from various sources. A total of 315 of the 481 questionnaires were completed and returned, yielding a 65.5 percent response rate. This response rate is exceptionally high. In mail surveys, a response of 20 percent is considered average and response rates as low as 10 percent are not uncommon.

Based on the information available, there is no reason to believe that nonrespondents (natural resource users who did not participate in the survey) had different views to express than those who did respond. In other words, there is no reason to suspect that a nonresponse bias exists.

4. Survey Response Limitations

As with any mail survey, there is no control over the way a respondent may choose to answer questions which she/he should ignore, or, on the other hand, disregard questions that require a response. In this study, for example, Question 1 asked the survey participants to indicate how often their company, agency, or group used Montana natural resource data for each of the listed purposes. A few of the survey participants chose not to respond to some of the answer categories. There are several explanations why this may have occurred, such as:

1) Question was confusing to respondent.
2) Answer categories were confusing to respondent.
3) Respondent was marking the questions in a hurried fashion to complete and return the questionnaire.
4) Respondent does not use natural resource information for that particular purpose so did not respond even though there was a answer choice of "never" use.

Because the pretest effort did not indicate that there were any major difficulties with the question or answer categories, the most probable cause for nonresponse would be that the respondents did not answer due to the hurried fashion in which the questionnaire was completed or because he/she believed the answer category did not pertain to their type of business.

III. SURVEY RESULTS

The following sections highlight the survey response rates by user groups and the results of the survey by unweighted and weighted results. For a complete listing of all survey response frequency distributions and selected cross-tabulations, refer to the supplement to this report.

A. Survey Response Rate

Survey questionnaires were mailed to 481 known or potential natural resource users, representing 13 target groups. A total of 315 survey forms were completed and returned, yielding a response rate of 65.5 percent. Table 2 presents the response rate for each user group. Local government planning boards, schools, federal government, state government, and universities had the highest response rate. The lowest number of responses was received by Indian tribes and natural resource attorneys.

Although several of the groups had exceptionally high response rates, some groups had a low number of questionnaires mailed out and returned. To ensure that interpretation of survey results were statistically valid, the relatively small diverse user groups (i.e., Indian tribes, natural resource attorneys, environmental groups, and special groups) were agglomerated and analyzed as a "combined" group. In addition, school and university groups were grouped and analyzed as the group "academia." By agglomerating these six groups into two, the total number of user groups for data analysis purposes became nine target groups.

B. Unweighted Results

The survey questions were designed with the common objective of identifying the natural resource data needs of the target user groups. To obtain this information, the questionnaire was divided into three basic types of questions: to identify characteristics of the respondents' agency, company, or group; to illicit responses and opinions concerning past aspects of natural resource data collection; and to characterize respondents' preferences for priorities in designing the NRIS system.

1. Characteristics of Respondents' Agency, Company, or Group

In addition to gathering information that would directly assist NRIS in designing the natural resource information system, questions were asked concerning the characteristics of the respondents' agency, company, or group. Responses to these questions will provide the NRIS with a basic description of the types of potential NRIS users.

Seventy-one percent (224 respondents) of the 315 survey participants spend less than $10,000 annually gathering existing Montana natural resource information, 11.8 percent (37 respondents) spend $10,000 to $50,000 a year, and 12.4 percent (39 respondents) spend more than $50,000 annually. Of the 39 users who spend more than $50,000 per year, 74 percent were from state government (13 respondents), academia (9 respondents), and federal government (7 respondents).

Although 78 percent (245 respondents) maintain a collection of technical data (e.g., reports, maps, documents), only 15 percent (48 participants) have an automated indexing or cataloging system for this

TABLE 2

RESPONSE RATE OF THE
13 NATURAL RESOURCE USER GROUPS

User Group	Number of Questionnaries Mailed	Number of Questionnaires Returned	Response Rate
Consultants	67	42	62.7%
University	45	36	80.0%
State Government	49	41	83.7%
Federal Government	45	38	84.4%
Indian Tribes	9	2	22.2%
Natural Resource Attorneys	18	5	27.8%
Environmental Groups	13	7	53.8%
Industry and Business[1]	77	30	39.0%
Local Government Planning Boards	43	37	86.0%
Special Groups	28	13	46.4%
Libraries	32	22	68.8%
Schools	7	6	85.7%
District Conservationists	48	36	75.0%
TOTAL[2]	481	315	65.5%

[1]Response rate without additional 25 questionnaires mailed by the Montana Mining Association would be 28/52 = 53.8%.

[2]Ten questionnaires also were returned by survey participants with a note of explanation that the survey was not applicable to their organization. Five questionnaires also were returned due to wrong/no forwarding address.

collection. Sixty-seven percent (32 respondents) of those with an automated indexing system were either from the federal government (13 respondents), state government (10 respondents), or academia (9 respondents).

Approximately 50 percent use an IBM PC or compatible computer system, 33 percent use a mainframe, and 22 percent specified various other types of systems. About 45 systems were specified in the "other" category, with Apple, MacIntosh, and Data General being named most often.

DBase II or DBase III was the most common software package used to maintain the databases, closely followed by Lotus 1-2-3. Only 1 percent reported using R:Base 5000 or Revelation, while 17 percent specified "other." The other category elicited over 40 different responses, with no particular allegiance to any specific software package. The software market today offers a wide variety of software choices to meet the needs of the consumer. A reflection of this wide range of choices can be seen in the diversity of software reportedly being used by the respondents.

The respondents were asked to indicate the frequency (often, sometimes, never) that they use natural resource data for the purposes of planning, preparing or reviewing permit applications, preparing or reviewing environmental impact statements (EIS), and research. Planning was the most frequent use made of natural resource data. Forty-three percent (135 respondents) indicated that they often make use of natural resource data and 37 percent (116 respondents) sometimes make use of the data for planning. District conservationists, local government planning boards, and federal government groups make more extensive use of natural resource data within their respective groups than did the other categories of users surveyed.

Nearly 40 percent of the respondents never use natural resource data for the purposes of either reviewing or preparing permit applications. This response rate may be attributable in part to the fact that some of the user groups (e.g., academia and libraries) are not involved with the government regulatory processes in their line of work. In addition, the decline in the coal mining industry as well as other natural resource-based industries in past years probably has limited the number of permit applications being processed, and thus could be reflected by such groups as industry, natural resource consultants, and government.

2. Aspects of Collecting Natural Resource Data

To provide the NRIS with background information on natural resource data being used by the respondents, questions were asked concerning the usefulness of various information sources and types of natural resource data. In addition, questions regarding the difficulty experienced by the respondent in natural resource data collection were asked. Responses to these questions will assist in the development of a system that will be useful to the potential user. Moreover, because past impediments to data collection were identified, an effort can then be made to overcome such data collection obstacles through the NRIS program.

a. Respondents' Perception of Useful Data Sources. Approximately 93 percent thought state and federal agencies were useful or very useful as a source of natural resource information (Table 3), whereas private corporations or foundations were regarded by 34 percent as being not a

TABLE 3

RESPONDENTS' PERCEPTION OF USEFULNESS OF NATURAL RESOURCE INFORMATION SOURCES

Information Source	Very Useful	Useful	Not Useful
Federal Agencies	61.0%	31.1%	5.4%
State Agencies	62.9%	31.4%	3.2%
Private Corporations or Foundations	14.3%	46.0%	34.0%
Local Government Agencies	23.8%	51.4%	19.4%
Libraries	27.0%	48.9%	19.7%
In-House Expertise	50.0%	39.1%	7.3%

Note: Percents may not always sum to 100% because not all respondents answered within the answer categories or did not answer that particular question.

useful source of information. Types of natural resource data rated highly by the majority to be either useful or very useful were published maps, books and journal articles, expert personal communication, aerial photographs/imagery, and published technical reports. Forty-four percent indicated they did not use scientific specimens and 23 percent thought the specimens were not useful to their agency, company, or group.

b. Difficulty Experienced by Respondents in Obtaining Data. There appeared to be no significant level of difficulty experienced by respondents in obtaining natural resource data from libraries and federal, state, and local government agencies. More than half the respondents, however, reported that obtaining data from private corporations or foundations was difficult or very difficult. One respondent noted:

> Private corporations could be useful but they vary widely in whether they will give out info[rmation].

Unpublished technical reports and unpublished maps have been the most difficult types of data/information for respondents to obtain. Unpublished material is usually limited in circulation or not readily available to the public; thus, procuring unpublished documents can be a problem for many potential users.

Of the many natural resource categories, water resource data appears to be the most difficult to obtain (Table 4). Approximately 50 percent indicated that obtaining groundwater quality or quantity information was either difficult or very difficult. Next in order of difficulty of access were data on surface water quality or quantity. This relatively high level of difficulty is most likely due to the fact that extensive groundwater data have not been uniformly collected in Montana. The cost of groundwater research has limited data acquisition to specific areas where relatively large scale resource development projects occur.

c. Existing Impediments to Data Availability. Table 5 shows problems respondents have encountered in gathering Montana natural resource information. The most serious problem indicated by respondents was that they are unaware of existing sources. Based on the survey results, those respondents who indicated that obtaining natural resource information from unpublished reports or maps was difficult also reported being unaware of existing sources as being a problem. It is logical to conclude that the lack of knowledge of where to obtain unpublished data contributes significantly to the difficulty some potential users experience in obtaining such data.

3. Respondents' Preferences for the NRIS Program Design

NRIS seeks to improve the availability of natural resource information to those individuals or groups who use the data; therefore, it is necessary to determine the data need priorities of the users in the development of the NRIS system. Questions were asked that directly addressed the respondents' natural resource data needs with respect to the NRIS program.

The respondents were provided a list of several possible NRIS program developments and were asked to assign a priority (high, medium,

TABLE 4

LEVEL OF DIFFICULTY EXPERIENCED
BY RESPONDENTS IN DATA COLLECTION

Natural Resource Category	Very Difficult	Difficult	Not Difficult	Do Not Use
Climate	2.5%	18.4%	61.3%	14.0%
Air Quality	3.5%	22.9%	34.0%	34.6%
Geology	1.6%	17.1%	68.6%	9.2%
Soils	3.2%	17.1%	65.1%	11.1%
Surface Water Quality	5.4%	32.7%	39.7%	18.4%
Surface Water Quantity	5.4%	30.2%	42.5%	17.8%
Groundwater Quality	12.4%	38.1%	25.4%	20.0%
Groundwater Quantity	14.6%	36.2%	24.4%	21.0%
Vegetation	1.9%	23.8%	54.0%	16.5%
Forestry	1.0%	14.6%	57.8%	22.5%
Wildlife	2.5%	16.2%	57.5%	19.1%
Fisheries	2.5%	18.1%	52.4%	23.2%
Threatened/ Endangered Species	4.1%	17.1%	51.8%	22.9%
Rangeland Resources	1.6%	18.4%	53.3%	22.2%
Cropland Resources	2.2%	14.9%	51.4%	27.0%
Land Use	2.2%	29.8%	52.7%	11.4%
Mineral Resources	6.0%	29.5%	38.1%	21.0%
Energy Resources	4.1%	27.9%	38.1%	24.4%
Reclamation	3.2%	27.6%	41.3%	22.5%
Recreational Resources	1.9%	21.9%	47.9%	23.5%

Note: Percents may not always sum to 100% because not all respondents answered within the answer categories or did not answer that particular question.

TABLE 5

PROBLEMS ASSOCIATED WITH
GATHERING MONTANA NATURAL RESOURCE DATA

Problem	Serious Problem	Moderate Problem	No Problem At All
Data are not gathered uniformly statewide	22.2%	47.9%	22.5%
No centralized natural resource data sources exist	28.3%	48.9%	16.5%
Geographical areas in Montana for which no data exist	26.4%	51.4%	14.0%
Access to data restricted	7.9%	34.3%	48.6%
Delays in obtaining data	13.7%	48.3%	29.5%
Cost constraints in obtaining data	21.3%	37.1%	33.3%
Access to existing computer data bases not widely available	19.7%	42.2%	27.6%
Incompatible computer data bases	18.7%	36.8%	32.4%
Unsure of the best or most reliable data source	29.2%	43.5%	21.0%
Unaware of existing sources	41.0%	44.1%	11.1%

Note: Percents may not always sum to 100% because not all respondents answered within the answer categories or did not answer that particular question.

low) to each (Table 6). Approximately 57 percent thought a high priority should be assigned to two NRIS program developments--(1) automated index to existing Montana natural resource information by geographical location of study area, and (2) automated index to existing Montana natural resource information by subject area.

The type/scale of base map that would be most useful to natural resource users would be USGS 1:24,000, whereas the least useful map would be USGS 1:1,000,000. Respondents demonstrated a distinct and unambiguous preference for the largest scale map (i.e., 1:24,000) with their level of preference declining with scale reductions (Table 7).

The type of geographical indexing that would be most useful to 89 percent of the respondents would be county and township and range. Forty-four percent do not use universal transverse mercator and 21 percent thought it would not be useful search criterion in the NRIS database.

C. Weighted Results

Each possible response on the questionnaire was weighted equally for all 9 groups and then averaged to develop an "average group" response. These proportions are illustrated in the supplement to the report.

Upon investigation, it would appear that the average group response distributions are quite similar to the unweighted distributions. This could be seen when contingency table analysis (Chi-square) was performed on both groups (i.e., unweighted and average group responses) to test the hypothesis that the response proportions were the same for both weighted and unweighted responses.

The results from this analysis are presented in Section C of the supplement to this report. The results show that for all questions, the distribution are indeed nearly the same so that no new insight into the survey results may be obtained by investigating the weighted responses. Thus, the conclusions presented in the previous section (B. Unweighted Results) apply to the weighted responses as well.

D. Response Differences Between User Groups

Cross-tabulations were run with the 9 groups and all possible variables or questions (refer to supplement to the report). The Chi-square statistics are presented at the bottom of each table and, together with the stated probability, may be used to test the groups for independence related to the possible responses. For example, when the user groups are cross-tabulated with Question 1, part 1 (whether their agency, company, or group use Montana natural resource information for planning purposes), the hypothesis that groups responded in a like manner is rejected with a probability greater than .99 because the calculated Chi-square value from the sample (56.29) is larger than the tabled Chi-square value at the .99 level (32.0) with 16 degrees of freedom. This type of testing can be done for each cross-tabulation; however, one must change the Chi-square value if the columns are more or less than the number (3) presented in this example.

The table in Section B of the supplement to the report lists all questions where a significant difference (at the .95 level) existed among

TABLE 6

PRIORITIES OF NRIS PROGRAM DEVELOPMENT
AS ASSIGNED BY RESPONDENTS

Program Development	High Priority	Medium Priority	Low Priority
Automated index to existing Montana natural resource information by geographical location of study area	58.4%	28.3%	10.2%
Automated index to existing Montana natural resource information by subject area	56.2%	30.2%	10.5%
Centralized statewide data-base in one or more natural resource categories	31.4%	48.9%	16.2%
Statewide natural resource information system	26.4%	52.1%	16.8%
Directory of environmental impact studies conducted in Montana	20.3%	42.2%	34.0%
Atlas of Montana natural resources	28.3%	43.5%	24.4%

Note: Percents may not always sum to 100% because not all respondents answered within the answer categories or did not answer that particular question.

TABLE 7

TYPE/SCALE OF BASE MAP PREFERRED
BY RESPONDENTS

Base Map	Very Useful/Useful	Not Useful
USGS 1:24,000	88.6%	4.4%
BLM 1:100,000	73.4%	13.3%
Montana Highway 1:125,000	60.6%	26.7%
AMS 1:250,000	48.0%	34.6%
USGS 1:500,000	45.7%	38.7%
USGS 1:1,000,000	32.7%	49.5%

Note: Percents may not always sum to 100% because not all respondents answered within the answer categories or did not answer that particular question.

groups in response to the questions. In general, nearly all questions that required some degree of interpretation by the respondent or that provided "do not use" as a possible response (e.g., Question 10 - very difficult, difficult, not difficult, and do not use) showed significant group differences.

In Question 3 (usefulness of base maps), the groups responded to the usefulness of types of maps quite differently. This was not unexpected because different map scales are required for various projects. Similarly, in Question 5 (problems in gathering natural resource data), the groups did not perceive the problems associated with gathering data the same. Diversity in question responses among user groups may reflect specific job-related data needs. Because of the variety of natural resource applications among user groups, it is expected that different perceptions of data gathering problems and usefulness of sources and types of information would exist.

IV. CONCLUSIONS AND RECOMMENDATIONS

The NRIS was established to develop, implement, and maintain a comprehensive program for acquisition, storage, and retrieval of Montana natural resource information. To design the most useful system, NRIS must examine user needs for data and impediments that may exist in obtaining needed data. The system must be easily accessible, effective, and efficient for the users; in other words, the system must be marketable (i.e., of value, either real or perceived, to the user).

The first step in assessing what information should be contained in the NRIS information system was to determine useful types and sources of natural resource data and what preferences potential users have for the NRIS program. This was accomplished through the mail survey conducted for this study. Based on the responses to the survey, the following recommendations are suggested:

1) NRIS should give high priority to apprising users of existing information sources. This could best be accomplished by establishing automated indices to natural resource information by geographical location and subject area.
2) USGS 1:24,000 quadrangle maps should be given highest priority as the base map for mapping of Montana natural resource data.
3) Geographical indexing of data should allow retrieval on a county and township/range basis as a first priority.
4) Special attempts should be made by NRIS to improve user access to databases of private corporations and foundations so that the data can be incorporated into the NRIS automated index system and made more widely available.
5) Indexing of all sources of natural resource information (other than scientific specimens) should be implemented without priority to any particular sources, except that highest priority should be given the sources that are not already indexed.
6) NRIS should consult with agencies, companies, or groups that have an automated indexing system of natural resource data to ensure that enhancement, not duplication, of a statewide indexing system is provided.
7) Hard copy of a data search should be made available, at a nominal cost, to the users who cannot access the system.

The second step, which is not part of this study, is to market the information system. One of the most serious problems reported by respondents was that they were unaware of existing data. The NRIS system could effectively fill this gap if sufficient numbers of the natural resource data users can avail themselves of NRIS services. To promote awareness and subsequent use of NRIS, an effective marketing or advertising campaign will need to be enacted to inform user groups of the existence and potential value of the NRIS project.

Support of the program by potential users appears to exist. This support could be seen in the enthusiasm that was expressed by almost every

Q-10 How much difficulty has your agency, company or group experienced in obtaining data for the following Montana natural resource categories?

		Very Difficult (1)		Difficult (2)		Not Difficult (3)		Do Not Use (4)		Multiple Response (7)		No Response (0)	
1)	CLIMATE	8	2.5%	58	18.4%	193	61.3%	44	14.0%	1	0.3%	11	3.5%
2)	AIR QUALITY	11	3.5%	72	22.9%	107	34.0%	109	34.6%	2	0.6%	14	4.4%
3)	GEOLOGY	5	1.6%	54	17.1%	216	68.6%	29	9.2%	2	0.6%	9	2.9%
4)	SOILS	10	3.2%	54	17.1%	205	65.1%	35	11.1%	2	0.6%	9	2.9%
5)	SURFACE WATER QUALITY	17	5.4%	103	32.7%	125	39.7%	58	18.4%	1	0.3%	11	3.5%
6)	SURFACE WATER QUANTITY	17	5.4%	95	30.2%	134	42.5%	56	17.8%	3	1.0%	10	3.2%
7)	GROUNDWATER QUALITY	39	12.4%	120	38.1%	80	25.4%	63	20.0%	3	1.0%	10	3.2%
8)	GROUNDWATER QUANTITY	46	14.6%	114	36.2%	77	24.4%	66	21.0%	3	1.0%	9	2.9%
9)	VEGETATION	6	1.9%	75	23.8%	170	54.0%	52	16.5%	1	0.3%	11	3.5%
10)	FORESTRY	3	1.0%	46	14.6%	182	57.8%	71	22.5%	1	0.3%	12	3.8%
11)	WILDLIFE	8	2.5%	51	16.2%	181	57.5%	60	19.1%	3	1.0%	12	3.8%
12)	FISHERIES	8	2.5%	57	18.1%	165	52.4%	73	23.2%	2	0.6%	10	3.2%
13)	THREATENED/ ENDANGERED SPECIES	13	4.1%	54	17.1%	163	51.8%	72	22.9%	1	0.3%	12	3.8%
14)	RANGELAND RESOURCES	5	1.6%	58	18.4%	168	53.3%	70	22.2%	1	0.3%	13	4.1%
15)	CROPLAND RESOURCES	7	2.2%	47	14.9%	162	51.4%	85	27.0%	2	0.6%	12	3.8%
16)	LAND USE	7	2.2%	94	29.8%	166	52.7%	36	11.4%	1	0.3%	11	3.5%
17)	MINERAL RESOURCES	19	6.0%	93	29.5%	120	38.1%	66	21.0%	3	1.0%	14	4.4%
18)	ENERGY RESOURCES	13	4.1%	88	27.9%	120	38.1%	77	24.4%	3	1.0%	14	4.4%
19)	RECLAMATION	10	3.2%	87	27.6%	130	41.3%	71	22.5%	4	1.3%	13	4.1%
20)	RECREATIONAL RESOURCES	6	1.9%	69	21.9%	151	47.9%	74	23.5%	2	0.6%	13	4.1%
21)	OTHER: SPECIFY BELOW	2	0.6%	2	0.6%	0	0.0%	0	0.0%	0	0.0%	311	98.7%

Q-11 Does your agency, company or group maintain a collection of technical materials (such as reports, maps, or documents) on Montana natural resources?

1)	YES	245	77.8%
2)	NO	63	20.0%
7)	MULTIPLE RESPONSE	0	0.0%
0)	NO RESPONSE	7	2.2%

Q-12 Is your collection of materials indexed or catalogued using a computer system?

1)	YES	48	15.2%
2)	NO	195	61.9%
3)	SKIP TO Q-13	63	20.0%
7)	MULTIPLE RESPONSE	0	0.0%
0)	NO RESPONSE	9	2.9%

Q-13 Which of the following software packages are you using to maintain data bases? (Check all that apply.)

		Yes (1)		No Response (0)	
1)	DBASE II OR DBASE III	63	20.0%	252	80.0%
2)	R:BASE 5000	4	1.3%	311	98.7%
3)	REVELATION	4	1.3%	311	98.7%
4)	LOTUS 1-2-3	60	19.1%	255	81.0%
5)	NONE	153	48.6%	162	51.4%
6)	OTHER: SPECIFY	54	17.1%	261	82.9%

Q-14 Which of the following computer systems do you use? (Check all that apply.)

		Yes (1)		No Response (0)	
1)	IBM PC OR COMPATIBLE	157	49.8%	158	50.2%
2)	MAINFRAME	103	32.7%	212	67.3%
3)	NONE	83	26.4%	232	73.7%
4)	OTHER: SPECIFY	69	21.9%	246	78.1%

Q-15 Approximately how much does your unit (as specified on your mailing label) spend annually gathering existing Montana natural resource information?

1)	LESS THAN $10,000/YEAR	224	71.1%
2)	$10,000 TO $50,000/YEAR	37	11.8%
3)	MORE THAN $50,000/YEAR	39	12.4%
0)	NO RESPONSE	15	4.8%

Q-16 The NRIS is planning to publish a free, quarterly newsletter that may be of interest to natural resource data users. Would you like to be included on the NRIS newsletter mailing list?

1)	YES	300	95.2%
2)	NO	10	3.2%
0)	NO RESPONSE	5	1.6%

USER GROUP

1)	CONSULTANTS	42	13.3%
2)	UNIVERSITY	36	11.4%
3)	STATE GOVERNMENT	41	13.0%
4)	FEDERAL GOVERNMENT	38	12.1%
5)	INDIAN TRIBES	2	0.6%
6)	NATURAL RESOURCE ATTORNEYS	5	1.6%
7)	ENVIRONMENTAL GROUPS	7	2.2%
8)	INDUSTRY AND BUSINESS	30	9.5%
9)	LOCAL GOVERNMENT PLANNING BOARDS	37	11.8%
10)	SPECIAL GROUPS	13	4.1%
11)	LIBRARIES	22	7.0%
12)	SCHOOLS	6	1.9%
13)	DISTRICT CONSERVATIONISTS	36	11.4%

respondent (95 percent) in requesting to be put on the NRIS newsletter mailing list, and by a few of the respondents who retained the front page fact sheet, presumably for future reference. In addition, comments written by many respondents were not only informative, but were also supportive of the NRIS program. Written comments by the respondents included:

> Respondent A:
>
> There is a serious problem with the collection of Natural Resource Data in this state. It is fragmented very badly between many state & federal agencies. Collecting all of this will be a hard project. Some agencies like SRS have a tremendous amount of resource data gathered over the years--- by county, area, and state level. Many times we have to hunt for data or redo it when it's already available. I applaud what you are trying to do and feel it will benefit many and reduce costs for some government agencies.
>
> Respondent B:
>
> This program is one of the most exciting Montana has offered in many years. Please ask for help when state funding appears threatened. Lots of people will help. . .
>
> Respondent C:
>
> We have been watching the progress of NRIS with considerable interest. It should have been set up about 20 years ago. . .

To successfully promote NRIS, a strong case will need to be made that the system will save staff time, money, and provide reliable information sources. The fact that NRIS is located in state government will serve to dispel possible user group doubts that the program has been set up as strictly a business enterprise. Moreover, state responsibility for the program will promote uniformity in data availability and quality. Ultimately, increased data utilization will lead to well informed decision-making relative to natural resource management.

APPENDIX A

SURVEY PACKET

APPENDIX B

UNWEIGHTED SURVEY RESULTS

NATURAL RESOURCE INFORMATION SYSTEM

UNWEIGHTED SURVEY RESULTS

Q-1 How often does your agency, company or group use Montana natural resource information for each of the following purposes?

	Often (1)		Sometimes (2)		Never (3)		Multiple Response (7)		No Response (0)	
1) PLANNING	135	42.9%	116	36.8%	49	15.6%	0	0.0%	15	4.8%
2) PREPARING PERMIT APPLICATIONS	64	20.3%	101	32.1%	122	38.7%	1	0.3%	27	8.6%
3) REVIEWING PERMIT APPLICATIONS	65	20.6%	101	32.1%	113	35.9%	0	0.0%	36	11.4%
4) PREPARING\REVIEWING ENVIRONMENTAL ASSESSMENTS, ENVIRONMENTAL IMPACT STATEMENTS, OR PRELIMINARY ENVIRONMENTAL REVIEWS	91	28.9%	122	38.7%	79	25.1%	0	0.0%	23	7.3%
5) RESEARCH	83	26.4%	155	49.2%	62	19.7%	0	0.0%	15	4.8%
6) OTHER: SPECIFY BELOW	20	6.4%	10	3.2%	0	0.0%	0	0.0%	285	90.5%

Q-2 What priority would you assign to each of the following NRIS program developments?

	High Priority (1)		Medium Priority (2)		Low Priority (3)		Multiple Response (7)		No Response (0)	
1) AUTOMATED INDEX TO EXISTING MONTANA NATURAL RESOURCE INFORMATION BY GEOGRAPHICAL LOCATION OF STUDY AREA	184	58.4%	89	28.3%	32	10.2%	0	0.0	10	3.2%
2) AUTOMATED INDEX TO EXISTING MONTANA NATURAL RESOURCE INFORMATION BY SUBJECT AREA	177	56.2%	95	30.2%	33	10.5%	0	0.0%	10	3.2%
3) CENTRALIZED STATEWIDE DATA BASE IN ONE OR MORE NATURAL RESOURCE CATEGORIES	99	31.4%	154	48.9%	51	16.2%	1	0.3%	10	3.2%
4) STATEWIDE NATURAL RESOURCE GEOGRAPHIC INFORMATION SYSTEM	83	26.4%	164	52.1%	53	16.8%	0	0.0%	15	4.8%
5) DIRECTORY OF ENVIRON-MENTAL IMPACT STUDIES CONDUCTED IN MONTANA	64	20.3%	133	42.2%	107	34.0%	0	0.0%	11	3.5%
6) ATLAS OF MONTANA NATURAL RESOURCES	89	28.3%	137	43.5%	77	24.4%	0	0.0%	12	3.8%
7) OTHER: SPECIFY BELOW	9	2.9%	0	0.0%	0	0.0%	0	0.0%	306	97.1%

Q-3 What type/scale of base map would be most useful to your agency, company or group in a comprehensive Montana natural resource data base?

	Very Useful (1)		Useful (2)		Not Useful (3)		Multiple Response (7)		No Response (0)	
1) USGS 1:24,000	217	68.9%	62	19.7%	14	4.4%	0	0.0%	22	7.0%
2) BLM 1:100,000	73	23.2%	158	50.2%	42	13.3%	2	0.6%	40	12.7%
3) MONTANA HIGHWAY 1:125,000	53	16.8%	138	43.8%	84	26.7%	1	0.3%	39	12.4%
4) AMS 1:250,000	27	8.6%	124	39.4%	109	34.6%	2	0.6%	53	16.8%
5) USGS 1:500,000	27	8.6%	117	37.1%	122	38.7%	1	0.3%	48	15.2%
6) USGS 1:1,000,000	12	3.8%	91	28.9%	156	49.5%	1	0.3%	55	17.5%
7) OTHER: SPECIFY BELOW	20	6.4%	5	1.6%	1	0.3%	0	0.0%	289	91.8%

Q-4 A possible function of NRIS would be to provide geographical indexing to existing sources of data which would allow users to search for data sources for any specific part of the state. If this were done, how useful would each of the following search criteria be to your agency, company or group?

	Very Useful (1)		Useful (2)		Not Useful (3)		Do Not Use (4)		Multiple Response (7)		No Response (0)	
1) COUNTY	181	57.5%	99	31.4%	8	2.5%	17	5.4%	1	0.3%	9	2.9%
2) LATITUDE-LONGITUDE	49	15.6%	98	31.1%	71	22.5%	77	24.4%	3	1.0%	17	5.4%
3) TOWNSHIP AND RANGE	181	57.5%	98	31.1%	6	1.9%	21	6.7%	1	0.3%	8	2.5%
4) UNIVERSAL TRANSVERSE MERCATOR	28	8.9%	44	14.0%	67	21.3%	140	44.4%	1	0.3%	35	11.1%
5) LAND OWNERSHIP	125	39.7%	121	38.4%	29	9.2%	25	7.9%	1	0.3%	14	4.4%
6) USGS HYDROLOGIC UNIT CODES	32	10.2%	107	34.0%	53	16.8%	98	31.1%	1	0.3%	24	7.6%
7) EPA RIVER REACH CODES	23	7.3%	83	26.4%	60	19.1%	122	38.7%	1	0.3%	26	8.3%
8) DEPARTMENT OF FISH, WILDLIFE & PARKS WATER CODES	24	7.6%	104	33.0%	59	18.7%	105	33.3%	2	0.6%	21	6.7%
9) OTHER: SPECIFY BELOW	9	2.9%	8	2.5%	0	0.0%	0	0.0%	0	0.0%	298	94.6%

Q-5 Please indicate whether each of the following has presented a serious problem, moderate problem, or no problem at all for your agency, company or group in gathering Montana natural resource data.

		Serious Problem (1)		Moderate Problem (2)		No Problem At All (3)		Multiple Response (7)		No Response (0)	
1)	DATA ARE NOT GATHERED UNIFORMLY STATEWIDE	70	22.2%	151	47.9%	71	22.5%	0	0.0%	23	7.3%
2)	NO CENTRALIZED NATURAL RESOURCE DATA SOURCES EXIST	89	28.3%	154	48.9%	52	16.5%	0	0.0%	20	6.4%
3)	GEOGRAPHICAL AREAS IN MONTANA FOR WHICH NO DATA EXIST	83	26.4%	162	51.4%	44	14.0%	0	0.0%	26	8.3%
4)	ACCESS TO DATA RESTRICTED	25	7.9%	108	34.3%	153	48.6%	0	0.0%	29	9.2%
5)	DELAYS IN OBTAINING DATA	43	13.7%	152	48.3%	93	29.5%	1	0.3%	26	8.3%
6)	COST CONSTRAINTS IN OBTAINING DATA	67	21.3%	117	37.1%	105	33.3%	0	0.0%	26	8.3%
7)	ACCESS TO EXISTING COMPUTER DATA BASES NOT WIDELY AVAILABLE	62	19.7%	133	42.2%	87	27.6%	0	0.0%	33	10.5%
8)	INCOMPATIBLE COMPUTER DATA BASES	59	18.7%	116	36.8%	102	32.4%	0	0.0%	38	12.1%
9)	UNSURE OF THE BEST OR MOST RELIABLE DATA SOURCE	92	29.2%	137	43.5%	66	21.0%	0	0.0%	20	6.4%
10)	UNAWARE OF EXISTING SOURCES	129	41.0%	139	44.1%	35	11.1%	0	0.0%	12	3.8%
11)	OTHER: SPECIFY BELOW	5	1.6%	0	0.0%	0	0.0%	0	0.0%	310	98.4%

Q-6 How useful to your agency, company or group are each of the following sources of information on Montana natural resources?

		Very Useful (1)		Useful (2)		Not Useful (3)		Multiple Response (7)		No Response (0)	
1)	FEDERAL AGENCIES	192	61.0%	98	31.1%	17	5.4%	0	0.0%	8	2.5%
2)	STATE AGENCIES	198	62.9%	99	31.4%	10	3.2%	1	0.3%	7	2.2%
3)	PRIVATE CORPORATIONS OR FOUNDATIONS	45	14.3%	145	46.0%	107	34.0%	0	0.0%	18	5.7%
4)	LOCAL GOVERNMENT AGENCIES	75	23.8%	162	51.4%	61	19.4%	0	0.0%	17	5.4%
5)	LIBRARIES	85	27.0%	154	48.9%	62	19.7%	1	0.3%	13	4.1%
6)	IN-HOUSE EXPERTISE	158	50.2%	123	39.1%	23	7.3%	0	0.0%	11	3.5%

Q-7 How much difficulty has your agency, company or group experienced in obtaining Montana natural resource information from the following sources?

		Very Difficult (1)		Difficult (2)		Not Difficult (3)		Multiple Response (7)		No Response (0)	
1)	FEDERAL AGENCIES	6	1.9%	73	23.2%	214	67.9%	4	1.3%	18	5.7%
2)	STATE AGENCIES	8	2.5%	56	17.8%	233	74.0%	3	1.0%	15	4.8%
3)	PRIVATE CORPORATIONS OR FOUNDATIONS	50	15.9%	128	40.6%	90	28.6%	2	0.6%	45	14.3%
4)	LOCAL GOVERNMENT AGENCIES	15	4.8%	104	33.0%	162	51.4%	1	0.3%	33	10.5%
5)	LIBRARIES	13	4.1%	53	16.8%	217	68.9%	1	0.3%	31	9.8%

Q-8 How useful are each of the following sources of natural resource information to your agency, company or group?

		Very Useful (1)		Useful (2)		Not Useful (3)		Do Not Use (4)		Multiple Response (7)		No Response (0)	
1)	BOOKS AND JOURNAL ARTICLES	119	37.8%	160	50.8%	14	4.4%	12	3.8%	0	0.0%	10	3.2%
2)	ENVIRONMENTAL IMPACT STATEMENTS	57	18.1%	153	48.6%	47	14.9%	45	14.3%	0	0.0%	13	4.1%
3)	THESES OR DISSERTATIONS	42	13.3%	122	38.7%	71	22.5%	69	21.9%	1	0.3%	10	3.2%
4)	BASELINE STUDIES	77	24.4%	138	43.8%	30	9.5%	58	18.4%	0	0.0%	12	3.8%
5)	PUBLISHED TECHNICAL REPORTS	109	34.6%	150	47.6%	20	6.4%	27	8.6%	0	0.0%	9	2.9%
6)	UNPUBLISHED TECHNICAL REPORTS	56	17.8%	117	37.1%	52	16.5%	73	23.2%	1	0.3%	16	5.1%
7)	SCIENTIFIC SPECIMENS	22	7.0%	65	20.6%	73	23.2%	139	44.1%	1	0.3%	15	4.8%
8)	PUBLISHED MAPS	179	56.8%	109	34.6%	6	1.9%	12	3.8%	1	0.3%	8	2.5%
9)	UNPUBLISHED MAPS	69	21.9%	91	28.9%	48	15.2%	87	27.6%	0	0.0%	20	6.4%
10)	AERIAL PHOTOGRAPHS/ IMAGERY	187	59.4%	80	25.4%	5	1.6%	30	9.5%	2	0.6%	11	3.5%
11)	DATA BASES-AUTOMATED	64	20.3%	102	32.4%	28	8.9%	93	29.5%	1	0.3%	27	8.6%
12)	DATA BASES-UNAUTOMATED	25	7.9%	123	39.1%	49	15.6%	89	28.3%	1	0.3%	28	8.9%
13)	EXPERT PERSONAL COMMUNICATION	156	49.5%	116	36.8%	8	2.5%	20	6.4%	1	0.3%	14	4.4%
14)	HISTORICAL ARCHIVES	37	11.8%	140	44.4%	38	12.1%	79	25.1%	0	0.0%	21	6.7%
15)	OTHER: SPECIFY BELOW	2	0.6%	2	0.6%	0	0.0%	0	0.0%	0	0.0%	311	98.7%

Q-9 How difficult has it been for your agency, company, or group to obtain Montana natural resource information from each of the following sources?

		Very Difficult (1)		Difficult (2)		Not Difficult (3)		Do Not Use (4)		Multiple Response (7)		No Response (0)	
1)	BOOKS AND JOURNAL ARTICLES	5	1.6%	70	22.2%	205	65.1%	21	6.7%	2	0.6%	12	3.8%
2)	ENVIRONMENTAL IMPACT STATEMENTS	10	3.2%	54	17.1%	177	56.2%	60	19.1%	1	0.3%	13	4.1%
3)	THESES OR DISSERTATIONS	24	7.6%	91	28.9%	101	32.1%	87	27.6%	1	0.3%	11	3.5%
4)	BASELINE STUDIES	17	5.4%	90	28.6%	122	38.7%	64	20.3%	1	0.3%	21	6.7%
5)	PUBLISHED TECHNICAL REPORTS	9	2.9%	64	20.3%	194	61.6%	34	10.8%	1	0.3%	13	4.1%
6)	UNPUBLISHED TECHNICAL REPORTS	49	15.6%	121	38.4%	44	14.0%	84	26.7%	2	0.6%	15	4.8%
7)	SCIENTIFIC SPECIMENS	14	4.4%	54	17.1%	49	15.6%	172	54.6%	2	0.6%	24	7.6%
8)	PUBLISHED MAPS	4	1.3%	37	11.8%	248	78.7%	14	4.4%	2	0.6%	10	3.2%
9)	UNPUBLISHED MAPS	37	11.8%	127	40.3%	48	15.2%	81	25.7%	3	1.0%	19	6.0%
10)	AERIAL PHOTOGRAPHS/ IMAGERY	17	5.4%	89	28.3%	156	49.5%	38	12.1%	1	0.3%	14	4.4%
11)	DATA BASES-AUTOMATED	25	7.9%	86	27.3%	74	23.5%	103	32.7%	2	0.6%	25	7.9%
12)	DATA BASES- UNAUTOMATED	31	9.8%	95	30.2%	62	19.7%	97	30.8%	2	0.6%	28	8.9%
13)	EXPERT PERSONAL COMMUNICATION	12	3.8%	65	20.6%	194	61.6%	25	7.9%	1	0.3%	18	5.7%
14)	HISTORICAL ARCHIVES	9	2.9%	88	27.9%	98	31.1%	97	30.8%	3	1.0%	20	6.4%
15)	OTHER: SPECIFY BELOW	1	0.3%	3	1.0%	0	0.0%	0	0.0%	1	0.3%	310	98.4%

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